Ex Post Aggregate Real Rates of Return in Canada: 1947-76

A. Tarasofsky, T.G. Roseman, H.E. Waslander

A study prepared for the
Economic Council of Canada

ADDENDUM

The series reported in Table 4-3 and Chart 4-4 are based upon annual dividends paid. Corresponding series, based upon *net* annual dividends paid (annual dividends paid less dividends received from taxable Canadian corporations), which may be more suitable for some purposes, were also developed but are not reported. The authors will be pleased to provide them upon request.

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Contents

Acknowledgments vii

Introduction 1

Part 1

1 The Concept of Corporate Income 5

2 The Effects of Inflation on Reported Profits and Other Variables 7

3 Two Issues Involving Depreciation: Capital Maintenance and Backlog 13

4 Real Rates of Return and Other Inflation-Adjusted Indicators 17

Part 2

5 Movements in the Ex Post Real Rate of Return 27

Appendixes

A Recent Analogous Research in Canada and the United States, and their Methodologies 33

B Notes on Data and Adjustment Methodology 35

C Supplementary Tables 39

Notes 41

Bibliography 43

List of Tables

4-1 Real After-Tax Rates of Return on Capital, by "Conventional" Method, 1947-76 19

4-2 Nominal and Real Effective Tax Rates, 1947-76 22

4-3 Nominal and Real Dividend Pay-Out Ratios, 1947-76 22

Appendixes

C-1 Nominal and Real Rates of Return on Capital Employed, 1947-76 39
C-2 Nominal and Real Rates of Return on Net Worth: Nonfarm, Nonfinancial Sector, 1947-76 40
C-3 Nominal and Real Rates of Return on Net Worth: Manufacturing Sector, 1947-76 40

List of Charts

4-1 Nominal and Real After-Tax Rates of Return on Capital Employed, 1947-76 18
4-2 Nominal and Real After-Tax Rates of Return on Net Worth: Nonfarm, Nonfinancial Sector, 1947-76 20
4-3 Nominal and Real After-Tax Rates of Return on Net Worth: Manufacturing Sector, 1947-76 21
4-4 Annual Incremental Retained Earnings as a Percentage of Real Before-Tax Profits 1947-76 23

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Introduction

This study is one of the background papers related to the Economic Council of Canada's *Sixteenth Annual Review*. This Annual Review shared with several of its recent predecessors – and will doubtless share with at least some of its immediate successors – a deep concern about the effects of inflation upon the Canadian economy. These effects are both numerous and profound. They leave their mark, unequal and inequitable though it may be, on every economic agent and every economic indicator – a mark that is all the more damaging for being obscured by the wedges that inflation drives between economic measurements expressed conventionally, in current dollars, and their real, generally unexpressed, values. Those wedges driven between profits measured in conformity with conventional accounting methods and real profits are particularly important. They facilitate misperception of their true situations on the part of firms' managements – misperception that may well prompt behaviour that is inconsistent with their objectives and contrary to their firms' best interests. Analogous misperceptions may also be caused and inappropriate behaviour prompted in financial markets. The possibility also exists that certain institutional arrangements – such as tax rules – may, because they are couched in terms of conventionally measured profits, produce effects that were unintended by the tax authorities and are in any case inappropriate.

The primary purpose of this study is to identify and remove those inflationary wedges that have impinged during the 30 years since 1946 upon certain important economic measurements. These measurements are: the annual rates of return actually earned in the aggregate by the Canadian industrial sector, the effective annual tax rates that it actually paid, and the annual dividend payout ratios that is actually experienced.

This study goes beyond its main objective in two respects. First, it makes a beginning – broadly analogous to several U.S. studies – in the empirical analysis of real rates of return in Canada by examining a number of factors thought to influence the variations in the rate of return. The factors investigated include the rate of inflation, the acceleration of inflation, and productivity – variables often connected with business performance.

Second, while deriving and measuring the requisite inflation adjustments, the authors have reviewed and made selections from various approaches available in the literature. In the process they have developed views regarding fundamental accounting concepts and inflation adjustments that may help to clarify and perhaps resolve some of the current controversies in the field. Conveying these views is an important purpose of this study.

The importance of determining the real, as opposed to the merely apparent, values of the rates of return and related average measurements is considerable. Ex post aggregate real rates of return are central to an understanding of an economy's past investment and growth performance, and they may provide important indications of its future performance. The sizes of the gaps between their real values and their corresponding reported values may also shed useful light on the past behaviour of financial markets and may well have implications for future behaviour. Much the same can be said of real effective tax rates and real dividend pay-out ratios, since real retained after-tax profits constitute the actual resources that corporations have set aside for the future at the end of each year.

The rate of return earned by a firm is a relative measure of its profitability. It relates the firm's profits (income) to some of its other attributes, in particular its capital employed and its shareholders' equity. Although all of the constituent concepts are well established in conventional accounting practice, there is some discussion of them here. The concept of income receives particular attention, since the adjustments made to correct reported profits for the distortions caused by inflation are intended to restore the measurements that would otherwise have obtained during the period reviewed. Hence a clear understanding of the meaning of what is being measured is especially desirable. In addition, at a

later stage in the study the notion of capital maintenance, which underlies the income concept, is discussed further. One purpose is to clarify it in relation to depreciation, and the other is to offer our view on an important issue – again involving depreciation – that has arisen with respect to inflation adjustments.

There is less need to discuss extensively the concepts of capital employed in the firm and of shareholders' equity, but a certain amount of discussion is necessary. Our view of the former concept differs somewhat from other views found in the literature, and this must be explained. Similarly, with regard to the latter concept, the exigencies of the data prevent us from disaggregating the various categories of shareholders in the fashion possible when dealing with individual firms; so here, too, explanation is necessary.

Though the period from 1947 to 1976 is the longest examined, this is by no means the first study of ex post aggregate real rates of return in Canada. The methodologies adopted in some – though by no means all – of the other studies and in analogous U.S. studies differ from one another, sometimes quite significantly; hence they also differ in various ways from the methodology adopted in this study. In order to assist the reader in positioning this study in relation to the previous work, a brief review of these analogous Canadian and U.S. studies, highlighting their main similarities to, and differences from, this study, is presented as Appendix A.

Part 1

1 The Concept of Corporate Income

The notion of corporate income (profit) is to a large extent a matter of perspective. In other words, when defining it, the first question to be asked is: Whose income? The fact is that there are always a number of claimants on any firm's assets and income flows. These include bondholders, banks and other short-term lenders, as well as the holders of preferred and common shares. Each of these claimants views the results of the firm's operations from a different vantage point.

The perspective most commonly adopted – by tax authorities, the accounting profession, financial analysts, and national income accountants – when defining and measuring a corporation's income is that of its owners – the preferred and common shareholders. Seen from their perspective, the firm is an ongoing entity that is expected to continue operating for the foreseeable future in the same broad line of business *and whose capacity to do so must therefore be preserved*. This is the approach to the measurement of income that has traditionally prevailed, explicitly or implicitly, in Canada, as well as in many other countries. Since it is not the proper function of inflation adjustments to alter the pre-existing concept of income, this approach also underlies the adjustments discussed below. Although, as will be seen below, it does not square fully with that concept, this approach is broadly in the spirit of one version – namely, the operating (productive) capacity version[1] – of what is widely known as the "capital maintenance" concept of income. As formulated by Hicks, among others, a firm's profit for a given period consists of the maximum amount that it can distribute to its owners at the end of that period, after having made provisions that leave it as "well off" as it was at the start of the period.[2] In order for it to remain as well off as it was before, the firm's operating capacity must implicitly be maintained.

Hence profits – the amount that can safely be distributed to the owners at the end of a given accounting period – are defined, in effect, as the revenues that remain in the firm after all of the deductions required to accomplish this preservation of capital have been made. Of necessity, these deductions must include provisions, in the form of depreciation and depletion allowances, for the degree to which the useful lives of capital assets have diminished during the period.

In the accounting traditions from which Canadian practices derive, the primary focus in measuring a firm's profits is on operating income – profits arising from sales of the goods that the firm produces or in which it trades. The firm is regarded in effect as being in the business of selling certain assets (inventories) and not selling others (capital assets). In keeping with a conservative tradition that prefers to err on the side of understatement rather than risk overstatement of profits, a further distinction is usually made between realized and unrealized profits, of the kind that might arise, for example, from changes in the market values of the firm's capital assets and debt instruments. (This represents a deviation from what might be termed the pure concept of capital maintenance.) When these unrealized profits are realized through the intermittent disposal of capital assets or the retirement of debt, they are then included in the firm's distributable income but are usually reported separately from its operating income.

It has also traditionally been a fundamental principle of conventional accounting practice in Canada that profits should be calculated by matching current costs with current revenues. As to valuing assets, two rules have generally applied: capital assets are reported at historical cost and the others at cost or market value, whichever is lower. Except for the sometimes significant problems arising from changes in relative prices and from the not insubstantial problems inherent in the determination of the market values of the assets of a going concern, this approach worked reasonably well throughout the era of relative stability in the purchasing power of money. The underlying principles were widely known and understood; they carried the imprimatur of the accounting profession; and they were broadly accepted by governments for the purpose of levying

taxes. They also made it possible, within limits, for financial statements to be used for the objective evaluation of a firm's performance and financial position and also to compare these with those of other firms.[3] The advent of chronic inflation, however, drastically altered this state of affairs.

2 The Effects of Inflation on Reported Profits and Other Variables

Inflation, whether fully, partly, or not at all anticipated by the firm, has far-reaching, if varying, effects upon its earnings and upon its overall financial position. As will be shown below, it tends to open up a gap between reported profits, calculated by means of conventional accounting methods, and real profits – namely, the firm's profits after all of the necessary provisions have been made to ensure maintenance of its operating capacity. Inflation also tends to alter the effective rate of income tax paid by the firm, and it may cause the portion of profits that the firm's management actually distributed in dividends to differ from the portion that it intended to distribute. We now identify and adjust for the various effects of inflation that are not adequately reflected by conventional accounting methods or by present Canadian tax rules. As indicated above, these adjustments are intended to conform to the traditional approach for measuring the firm's income – broadly speaking, the operating capacity version of the capital maintenance approach. They are intended, in other words, to derive as closely as possible the same income measurements that conventional accounting would have done had prices remained stable over the interval examined.

Before turning to the various adjustments to reported profits necessitated by inflation, it is useful to apprise the reader of the approach adopted with respect to the issue of the appropriate price index for correcting the reported values of the assets and liabilities of the firms included in the aggregates. We have not adopted the view implicit in the "general price level" approach, whereby the same price index is applied to all of the values to be adjusted. We have instead used several price indexes, each applied to the specific items to which it had the most relevance. We share the view adopted by virtually all of the authors of the analogous work with which we are familiar, that the overall effect of price changes upon a firm's reported profit for a given accounting period consists of the sum of their individual effects upon the specific types of assets that the firm held during the period as well as upon the liabilities that it incurred. As a practical matter, however, not too much should be made of this issue, since we suspect that neither our estimates nor their trends, especially the latter, would have been significantly different had we relied upon only one index.

Depreciation Adjustment

The rate of depreciation refers to the annual rate at which a capital asset's productive life erodes because of wear and tear and obsolescence, and the annual provision for depreciation expense is intended to charge systematically against profits the corresponding proportion of the asset's value. Although this provision has traditionally been regarded primarily as a means of cost allocation, it has also been recognized as having the important consequence of sheltering within the firm adequate resources with which to replace the depreciated assets when the time came to do so. This is not to suggest that provision for depreciation involves the setting aside of specific resources for this purpose; it does not. What it does represent is a reduction in distributable earnings, which prevents the (unspecified) resources in question from leaving the firm inadvertently in the form of dividends.

Both conventional accounting and Canadian income tax rules have hitherto defined depreciable asset value as historical cost, although they have tended to differ conceptually as to the base to which the annual rate of depreciation should be applied. The former has commonly involved the straight-line method, whereby a constant annual rate is applied to historical cost. This method implicitly assumes that capital assets depreciate at a uniform rate over their useful lives. The latter, on the other hand, has generally required that the diminishing-balance method be followed, whereby the prescribed annual rate is applied to the undepreciated portion of the asset's historical cost.[1] Here the implicit assumption is that the degree of erosion decreases as the asset ages.

Inflation renders inadequate the depreciation charges based on historical cost; the higher and the more chronic the inflation, the greater the inadequacy. This has been widely recognized for many years, but both the Canadian accounting profession and tax authorities have continued to rely on the historical cost base. There are now strong indications that the former, at least, is moving towards a new base, perhaps as a supplement to the traditional one. This has already happened, or is about to happen, in many countries, including the United States, so there is little danger that Canada will be plunging into uncharted waters.[2]

To say this, however, is by no means to deny that going to a new base involves difficulties. The great, if increasingly irrelevant, merit of historical cost is that it is objective, while virtually any version of replacement cost must inescapably reflect some degree of subjectivity. Subjectivity, of course, is an outstanding *bête noire* in accounting, because it impedes the attainment of comparability among firms and industries; and this is a consideration not to be minimized. But neither should the difficulties that admittedly attend estimation of the continually changing current prices of capital assets under inflationary conditions be exaggerated. Reliable industry-specific indexes for depreciable assets are now provided by Statistics Canada and in quite a few other countries as well. In any event general price indexes are also available. Granted that their use would obscure differences between firms and industries, it is nevertheless true that if they were applied uniformly and consistently assets valued thereby would be much less misleading than historical cost values.

The basic procedure for calculating a firm's depreciation expense on a replacement cost basis involves adjusting, at the end of a given current year, the acquisition costs of the stock of depreciable assets held, so as to reflect their current replacement costs. Since these assets were acquired during the current and previous years, the firm must first age them according to the years in which they were acquired. It must then adjust the costs of the assets acquired in each of these years on the basis of the appropriate index representing the cumulative price change from the year of acquisition to the current year. Having thus derived the current replacement costs of the assets, the current year's depreciation expense is calculated for each group of assets by applying to its current replacement cost the appropriate rate of depreciation.

This study being an analysis of aggregates, it was impossible to age depreciable assets in the manner described above, which would be appropriate to an individual firm for which the necessary data would presumably be available. Instead, a perpetual inventory method developed at Statistics Canada was adapted to the needs of the present analysis. How this was done is described in considerable detail in Appendix B.

The inflation-adjusted depreciation expenses calculated for each year along the foregoing lines, being a (negative) component of inflation-adjusted profit, enter into the numerators of each year's rates of return on capital employed and on net worth. The assets that have given rise to these expenses are, of course, part of both capital employed and net worth. They therefore enter into each year's denominators at values that reflect the undepreciated portions of their current year's replacement cost. In other words, for the purpose of the denominators, accumulated depreciation – the aggregate of the current and previous years' depreciation expense – is calculated entirely on the basis of the current year's replacement values. Of necessity, the accumulated depreciation expenses implicit in these undepreciated asset values exceed the sum of the annual replacement-cost depreciation expenses attributed to the current and preceding years respectively. These accumulated depreciation components of the denominations are calculated in effect on the basis of "backlog" depreciation; the depreciation expense components of the numerators are not. Because of the positions adopted on the issue of backlog depreciation by some authoritative Canadian and British accounting bodies and because its quantitative implications are substantial, this matter is discussed further in Chapter 3. There is also a discussion in Chapter 3 on the relationship between the provision for depreciation expense and the operating capacity version of the capital maintenance concept of income. This is intended to clarify certain ambiguities that exist in some of the literature.

Depletion Adjustment: Depletable Assets and Land

Depletion expense is the proportion of the cost of a firm's nonrenewable resources that is used up in a given year. Although it might be thought that the conceptual adjustment would, in principle, have a good deal in common with the depreciation question, it has received very little attention in the literature.[3] In any event, especially severe data problems precluded any attempt to proceed along the same lines as were followed in regard to depreciation.[4] Consequently the admittedly imperfect adjustments consisted of adjusting both annual depletion expense and net depletable assets by a measure of inflation based on

the corresponding indexes for buildings and equipment. The same indexes, incidentally, were also used to estimate the replacement values of land.

Cost-of-Sales Adjustment

The basic, traditional accounting principle governing the imputation of a monetary value to a firm's stocks of raw material, work in process, and finished goods is that the imputed value should reflect the cost or market value, whichever is lower. While it is never easy to ascertain the market values of an ongoing enterprise's inventories, there is also the further problem in Canada of measuring the cost of those inventories during inflation. This problem arises because, under the inventory valuation rules accepted for tax purposes in Canada, firms are placed in the position, when calculating their cost of sales, of matching current selling prices with costs that reflect earlier, and therefore lower, prices. In other words, the tax rules prevent firms from applying to current selling prices the costs that would need to be currently incurred in acquiring or producing the goods sold.

There are three alternative assumptions that can be made as to the sequence in which a firm's inputs are transformed and sold as outputs: 1/ that the inputs acquired first are transformed and sold first; 2/ that they are transformed and sold last; or 3/ that they are transformed and sold in variable sequences. The first and last of these alternatives are accepted for tax purposes in Canada, and both are apparently widely used. The first, known as the first-in/first-out method of inventory valuation (FIFO), needs no further description. The last, which is not commonly specified for all firms that rely on it, involves the use of some average of the cost prices prevailing during the relevant period. It produces an inventory valuation that is intermediate between FIFO and the second alternative method, known as last-in/first-out (LIFO), which is not accepted by Canadian tax authorities even though it is widely adopted in some other countries, including the United States. The LIFO method is the only method of inventory valuation that inherently matches current input costs with current output prices.

As the result of denying Canadian firms the right to use the LIFO method of inventory valuation or an appropriate equivalent for tax purposes, their costs of sales have been continually understated, and their taxable incomes continually overstated, during the present inflationary era. For the same reason, reported profits have also been overstated. Thus, in order to adjust for this overstatement of profits, and on the assumption that firms used the FIFO valuation method, reported profits should be reduced by the following cost-of-sales adjustment.[5] (The indexes used may be obtained from the authors upon request.)

$$CSADJ_i = \frac{\Delta p_i}{p_{i-1}} \, INV_{i-1}$$

where

- Δp_i = change in the production cost index during the current year;
- p_{i-1} = production cost index of the previous year; and
- INV_{i-1} = opening inventories of the current year.

In an effort to ameliorate this problem, the Minister of Finance introduced a deduction of 3 per cent of opening inventory, to apply to 1977 and subsequent years. The Minister pointed out that:

> This measure does not represent a comprehensive response to the problems caused by the interaction of inflation and taxation on business income. However, it will provide a broad measure of relief and thereby enhance the flow of internally generated funds available for business expansion. It also has the considerable merit of being simple to use and requires no fundamental change in accounting practices.[6]

Debt Adjustment

Inflation reduces, by definition, the monetary unit's command over goods and services; hence it necessarily affects the relationship between borrowers and lenders. Since debt is denominated in dollar terms, lenders stand to lose, and borrowers to gain, from inflation. Interest rates therefore rise, as lenders seek to maintain the real yield on the loan and to preserve its real value. Economic theory has traditionally held that, under ideal conditions in a tax-free world, if the rate of inflation is fully anticipated, it will be neutral in its effects on financial markets; that is, the resulting nominal rate of interest will consist of the sum of the real rate of interest and the rate of inflation, and the volume of lending will be unchanged.[7] More recent research has shown that this neutrality disappears when taxes and other realistic institutional factors are introduced into the analysis, especially the existence of marginal tax rates that differ between borrowers and lenders.[8]

The extent to which nominal interest rates rise when inflation is fully anticipated is, however, a secondary issue in this study. What is of greater relevance is the manner in which this inflation premium, which constitutes an additional cash transfer from borrower to lender, is treated by conventional accounting and by the tax authorities. For the borrower the nominal interest payment is recorded as an

operating expense, and it is deductible for tax purposes; for the lender it is recorded and taxed as income. No recognition is given in the accounts and in tax policy to the real gain of the borrower or to the real loss of the lender. Consequently, the reported profit of the former is understated and that of the latter overstated.

Because this study is concerned with ex post inflation-adjusted rates of return, it deals with the effects of actual inflation, irrespective of the degree to which it was anticipated. Therefore, instead of reducing the borrower's interest costs by the premium embodied therein for anticipated inflation, his income is increased by his gain on outstanding debt because of actual inflation. A corresponding, and opposite, adjustment is made to the income of the lender. The net effects of unanticipated inflation emerge indirectly, however, since the real gains or losses that occur when the actual rate of inflation differs from the anticipated one represent, in effect, transfers between a firm's creditors and its shareholders. They thus enter into the difference between the firm's real returns on capital employed and its real returns to equity (net worth), both of which are presented below.

The inflation adjustment with respect to short-term debt forms part of the adjustment with respect to other working capital, described below. As to net long-term debt, the adjustment, based on the assumption that the flow of funds is uniform throughout the year, is as follows:

Gain/loss on net noncurrent liabilities

$$= \left(\frac{NCL_i + NCL_{i-1}}{2}\right)\left(\frac{GNE_i - GNE_{i-1}}{GNE_{i-1}}\right),$$

where

NCL_i = net noncurrent liabilities at end of year i; and

GNE_i = GNE deflator for year i.

Other Working Capital Adjustment

Conventional accounting records most of the firm's current assets, other than inventories,[9] as well as its current liabilities at their cost or nominal values. This means that the contraction of their real values imposed by inflation and the real gains correspondingly bestowed on these liabilities are not captured in the accounts. These effects must be taken into account in determining the firm's real returns.

Assuming that the flows of current assets and liabilities are uniform throughout the year, the adjustment is as follows:

Gain/loss on other working capital

$$= \left[\left(\frac{CL_i + CL_{i-1}}{2}\right) - \left(\frac{CA_i + CA_{i-1}}{2}\right)\right] \times \left(\frac{GNE_i - GNE_{i-1}}{GNE_{i-1}}\right)$$

where

CL_i = current liabilities at end of year i;

CA_i = current assets other than inventories at end of year i; and

GNE_i = GNE deflator for year i.

Investments in, Loans to, and Loans from Canadian Affiliates Adjustments

The acquisition by one corporation of the shares of another corporation appears as an asset in the investing company's books, and the dividends earned on these shares appear as investment income and enter into its profits. Unless these shares were acquired when issued, there is no corresponding entry in the accounts of the corporation whose shares were bought, and the dividends paid on those shares, being charges to retained earnings, are not deducted from its profits. If the two corporations are in different sectors, the asset representing the investment could be considered part of the capital employed in the owning firm's sector; the dividends earned, part of its income. An inflation adjustment might well be necessary, though difficult to calculate, to reflect the changing real value of the asset. If, however, the two corporations are in the same sector, it would be necessary, in order to avoid double-counting, to exclude the asset from the capital employed and net worth of the owning company and to exclude the related dividends from its income. It was assumed as a practical matter that all affiliated corporations are in the same sector.[10]

Analogous considerations arise with respect to noncurrent loans to affiliates and regarding other long-term loans and mortgages receivable. Because, as noted, the data did not permit the necessary disaggregation, it was assumed that all the firms involved were in the same sector. These assets are, in effect, excluded from capital employed and from net worth. Although this tends to bias the estimates, the direction of the bias is not readily apparent. In any event, given the relative unimportance of the assets involved, the magnitude of the bias is probably slight.

Other Noncurrent Assets Adjustment

This category embraces a miscellany of items, ranging from deferred charges to a variety of intangible assets, such as goodwill, trademarks, franchises, and the like. The deferred charges usually refer to the various past costs of establishing and

maintaining the corporate entity and its financial instruments that have not been written off. It is reasonable to assume that the current equivalent of these costs would be higher because of inflation. The same is true of the intangible assets. There is, however, a practical problem in determining their current dollar value. Many of these items are carried in the accounts at a purely nominal value or at a cost value that has long since gone out of date. Since these items represent, as a group, a negligible proportion of total assets, it was decided, somewhat arbitrarily, to disregard them, both with respect to the inflation-induced changes in their real values and as components of capital employed and net worth.

Before reporting the nominal and real rates of return and other important inflation-adjusted variables that reflect Canadian experience in the aggregate since the end of the Second World War, a discussion of two issues rooted in the preceding concepts and methodology is presented in the next chapter. Though separate, these are related to each other, since they both concern depreciation. They are both of considerable conceptual importance, but the former also has the potential for considerable empirical significance.

3 Two Issues Involving Depreciation:[1] Capital Maintenance and Backlog

Capital Maintenance

As explained earlier, the income concept upon which the inflation adjustments are based is, subject to various traditional conservative practices with regard to unrealized profits and the valuation of assets, in the spirit of the operating capital version of the capital maintenance concept of income. There is a tendency in the literature to imply that this income concept requires, in order to preserve the firm's "well-offness," the maintenance of its operating capacity at precisely the same level at the end of each accounting period as at the start. For example:

> . . . It may be argued, in terms of Hicks' definition of income, that a business is not as 'well-off' at the end of the period as it was at the beginning unless it has at least maintained its capacity to continue its operations at the *same* level – i.e., unless it has maintained its operating capacity. A business which consistently fails to maintain its operating capacity will decline. It may be argued that such a business should not be considered profitable. Accordingly a profit should be reported only when operating capacity, as represented by a collection of assets, has increased.[2] [Emphasis added.]

This rationale, though not basically incorrect, is rather ambiguous. It is not clear whether the term "operating capacity" refers to the firm's capacity to produce the goods it sells or to the capacity of its net assets to either produce output or earn other revenue, such as interest. Neither is it clear how the firm's depreciable assets are to be viewed for the purpose of measuring "well-offness," whether in gross terms or net of accumulated depreciation. Most important, however, this type of formulation (which is not uncommon) clearly implies that the firm's operating capacity can increase only when a profit is earned. This implication, if unqualified, can be misleading, and it is our intention to clarify matters. In particular, it will be shown that a firm adhering to the capital maintenance concept of income will, if it merely breaks even in effect but holds assets for which depreciation expense is provided, necessarily tend to increase its capacity both to earn revenues and to produce output. In other words, the very existence of provisions for depreciation implies, during most of the replacement cycle of depreciable assets, increases in the firm's capacity to earn revenues and produce output, even if the firm retains no earnings at the end of each period.

Consider a new firm that breaks even (or, alternatively, a firm that distributes in dividends all of its after-tax profits) at the end of its first year. Assume that prices are stable. This firm's total gross assets less total liabilities at year-end will exceed the corresponding figure at the start of the year by the amount of depreciation expense provided for during the year; however, its total depreciated assets less total liabilities will remain unchanged. As to the mix of its assets – between, say, fixed depreciable assets and others – this is indeterminate. Given the way most firms operate, it is probable that fixed depreciable assets will have increased at least somewhat during the year.

We therefore find this firm, which has no retained earnings, in the following situation at the end of its first year. Its revenue-earning assets (we assume that the firm will decline to hold assets that earn nothing) have certainly increased, and its physical capacity to produce output has probably done so also, but to a lesser extent. Only in terms of *net* depreciated assets (total depreciated assets less total liabilities) has its position remained unchanged.

Assume further that these same conditions recur every year until the year when the firm's initial depreciable fixed assets are fully depreciated. By this time the firm is in a position to replace these assets *from its own resources*. In other words, it can apply a combination of cash and the proceeds of the sales of other assets (assume that their costs equal their market values) to the replacement of the depreciated assets. Assuming that this is done at the start of the next year, the replacement cycle is completed.

But what has been the pattern of the revenue-earning capacity and the capacity to produce output

over the cycle? The former rose steadily, increasing at the end of each intervening year by the annual provision for depreciation. The latter also rose, though less evenly and predictably. Both fell, however, when the depreciated assets were replaced – the former, by the full extent to which it increased over the life cycle of the depreciated assets; the latter, by the extent to which its undepreciated value increased over the cycle.

One variable, however, has not increased over the cycle because of the successive annual provisions for depreciation, and that is the value of the firm's initial gross assets less its initial liabilities – a sum that remains equal to the firm's net depreciated assets at the end of each subsequent year. Neither does it change when the depreciated assets are replaced. *It is therefore the value of net depreciated assets that alone represents the capital maintained and preserved by the annual provisions for depreciation.*

Inflation complicates but does not alter the foregoing argument. As we have seen, each year's provision for depreciation is represented by a corresponding increase in the firm's gross assets less its liabilities. If the firm provides for annual depreciation on the basis of the *current* year's replacement cost of its depreciable assets, accumulated depreciation will not suffice to equal the ultimate replacement price of these assets. But, as explained below, if the firm also makes the necessary annual inflation adjustments on all of its other assets and liabilities, it will preserve their real values and rectify this inadequacy. Thus it will succeed in sheltering from dividends, internally, sufficient resources to replace these depreciated assets at the end of their useful lives (assuming, again, that there are no capital losses on any assets because of bad investment decisions, or the like.)

It must be admitted, however, that this last assumption is somewhat facile, in view of the recent Canadian (and U.S.) experience with inflation. The behaviour of securities markets during the Seventies has shown that the market values of equities and bonds, which firms hold as both current and noncurrent assets, do not necessarily keep pace with inflation. This makes the inflation adjustment for these assets rather more complex, especially in the case of equities – and, above all, common equities. Bonds, after all, are denominated in dollar terms, and they have specific maturity dates. Equities generally lack both of these attributes; hence their future market values, when depreciated assets need replacing, are perhaps even harder to predict than those of bonds. The problem is further complicated by the accounting convention that requires marketable securities to be reported on the balance sheet at cost or market value, whichever is lower. This otherwise admirable rule, which is intended to prevent erring on the side of overstating the firm's profits and financial position, may have the inadvertent effect of obscuring the degree to which the firm is maintaining its capital, as this term was defined above. In any event, irrespective of how the firm might wish to report these assets on its balance sheet, it would not be unreasonable for it to adjust its annual distributable, though not its operating, profit by the amount necessary to close any gap that might exist between the market values of securities held and their acquisition costs in current dollar terms.

Backlog

In the most recent of its various pronouncements on the subject of inflation accounting,[3] the Accounting Research Committee of the Canadian Institute of Chartered Accountants adheres, after considering various alternatives, to much the same income concept as that adopted in this study – the operating capacity version of the capital maintenance concept of income. There are, however, some aspects of the Committee's approach with which we disagree. One of these warrants special attention, partly because of its quantitative importance but especially because the same notion has been presented in other authoritative investigations.[4] It may, therefore, have quite a material impact upon events in Canada, as it may already have had in the United Kingdom and other countries. The notion at issue involves what is known as "backlog" depreciation (also called "the amortization gap").

The underlying principle seems straightforward: at the end of any given year the undepreciated value of a depreciable asset should be that part of its current replacement price represented by the remaining proportion of its useful life.[5] When prices are stable, historical cost depreciation meets this requirement, but it naturally fails to do so during inflation (or deflation). Again, on the face of it, so does replacement cost depreciation when it is calculated each year on the basis of the replacement price prevailing at the end of *that* year. In the Committee's words:

> The expiry of the service potential of plant and equipment over extended periods of time results in some additional complications. In particular, if the current cost of an item of plant increases in each year of its useful life, the total amount of current cost depreciation expense charged at the expiry of its life will not equal cost of replacement at that date. The difference between total depreciation expense during an asset's life and the cost of replacement at the end of its useful life is often referred to as "backlog depreciation". For example, consider an asset costing $1,000 and having a useful life of two years. If the current cost of the asset increases by 20 per cent each

year, depreciation expense, based on the average current cost in each year, would be $550 in year 1 and $660 in year 2; the total of $1,210 is less than the current cost of $1,440 at the date of replacement. *The significance of this shortfall in assessing maintenance of operating capability depends on the pattern of asset replacements.* For example, take a situation in which an enterprise owns ten similar assets, each with a useful life of ten years, and the present ages of the assets range from one to ten years. The aggregate current cost depreciation expense on the ten assets would represent the current cost of the asset that needs to be replaced currently. *When an enterprise has a pattern of asset replacement that is subject to significant irregularities, backlog depreciation may become a material factor to be considered by management in assessing maintenance of operating capability.*[6] [Emphasis added.]

This view is hardly unprecedented.[7] The Sandilands Committee, for example, reviewed the issue at some length and agreed that accumulated depreciation is inadequate during inflation when replacement cost depreciation is computed on a current basis only. It also stated that strict adherence to the capital maintenance concept of income requires provision for backlog depreciation. But since its preferred concept of income was rather different, it concluded that, for many firms, it would be better if operating profits were calculated without providing for it. The Committee envisaged, presumably along lines similar to those of the above quotation, that these firms replace a fairly constant proportion of their depreciable assets each year. Hence current replacement-cost depreciation provisions would suffice to shelter from dividends the resources needed to replace old assets that had reached the end of their useful lives during that year. The Committee, however, shared the above view that firms that do not replace depreciated assets in this regular, revolving fashion would need to reduce operating profit by an adjustment for backlog depreciation.[8] A broadly similar view was taken by the Ontario Committee on Inflation Accounting.[9]

The fact is, however, that, *provided that all the necessary inflation adjustments are made to all of the firm's assets and liabilities* an adjustment for backlog depreciation is not necessary, irrespective of the sequence in which its depreciable assets are replaced.[10] The assets sheltered by the annual depreciation provision based on current replacement prices are, after all, distributed among the other assets held by the firm. In other words, some will be subsumed in working capital, including inventories, and the rest – often the largest part – will be composed of additional fixed assets.[11] The real values of the assets included in working capital and inventories will be maintained (and the inadequate earlier depreciation compensated for and shielded from dividends) by taking up the inflation loss on the former and the cost-of-sales adjustment on the latter. As to the assets included in fixed assets, there are two important considerations to keep in mind. Those that are depreciable will themselves be subject in subsequent years to replacement cost depreciation at current prices. In addition, these assets, as well as those that do not depreciate, such as land, will appreciate in value, usually at a rate corresponding approximately to the rate of inflation. It will thus be possible to replace those depreciable assets that have reached the end of their useful lives by means of the proceeds from the sales of an appropriate combination of working capital, inventories, and appreciated fixed assets.[12]

Another approach to backlog depreciation, which turns out to be compatible with ours even though the rationale differs somewhat, is described by the Sandilands Committee and by others.[13] This involves making the adjustment for backlog depreciation in the firm's balance sheet but not in its income statement; that is, the adjustment is applied to the firm's equity either as a reduction in retained earnings or other reserves or as a debit to the capital maintenance account, or equivalent (the credit being to accumulated depreciation). The central idea is that provision must be made to shield from dividends the additional resources that "regular" replacement cost depreciation fails to provide but that this additional amount should not be charged to operating income. Although there is some danger that firms may choose not to make this adjustment to equity in an unprofitable year,[14] it is apparent, given the foregoing argument, that this adjustment is not needed to correct nominal profits if all the other inflation adjustments are made. It is needed, however, to ensure that the net depreciated values of the assets in question are correctly reported.[15]

4 Real Rates of Return and Other Inflation-Adjusted Indicators

Capital Employed

Definitions of capital vary in the literature. A number of the writers who recently estimated rates of return have defined capital as the sum of inventories and the depreciated values of fixed assets at replacement cost.[1] This might be regarded as the conventional method, which focuses on the output of the firm and on the assets that produce it directly. Statistics Canada defines capital far more comprehensively – in effect, as total assets less current liabilities.[2] Whatever validity this definition may have in the context of the individual firm, it appears that major double-counting of interfirm loans, and so on, would result if it were applied to large aggregates such as those used in this study. Jenkins (1977*a*) defines capital as the sum of inventories, certain other working capital, and the depreciated values of fixed assets at replacement cost. This is closer to the spirit of the definition used here, since it recognizes that working capital is no less essential to the firm than inventories and fixed assets. Our definition implies a similar view but is somewhat broader. It embraces all current assets (including inventories) less current liabilities plus the depreciated values of fixed assets at replacement cost. (Hence the term "capital employed" is preferred.) This is equivalent to the sum of equity and net noncurrent liabilities, and it represents the net assets employed in the firm's operations.

Rate of Return on Capital Employed after Taxes

The nominal (reported) rate of return on capital employed, after taxes, is defined as follows:

$$NRC_i = \frac{RP_i - DV_i + IN_i - IT_i}{INV_i + OWC_i + BK_i + BL_i},$$

where

- RP_i = reported net profit before income taxes in year *i*;
- DV_i = dividends earned in year *i*;
- IN_i = net interest expense on net noncurrent liabilities in year *i*;
- IT_i = income taxes paid in year *i*;
- INV_i = inventories valued at FIFO at mid-year *i*,[3]
- OWC_i = other working capital at mid-year *i*;
- BK_i = depreciable and depletable assets at depreciated book value at mid-year *i*; and
- BL_i = land at book value at mid-year *i*.

In the light of the foregoing inflation adjustments, the real rate of return on capital employed is defined as follows:

$$RRC_i = \frac{RP_i - DV_i + BD_i - RD_i + IN_i - CSADJ_i \pm WC_i - IT_i}{INV_i + OWC_i + RK_i + RL_i},$$

where

- BD_i = book depreciation and depletion expense in year *i*;
- RD_i = replacement cost depreciation and depletion expense in year *i*;
- $CSADJ_i$ = cost-of-sales adjustment in year *i* (also known as inventory valuation adjustment);
- WC_i = real gain or loss on working capital in year *i*;
- RK_i = depreciable and depletable assets at depreciated replacement cost at mid-year *i*; and
- RL_i = land at replacement cost at mid-year *i*.

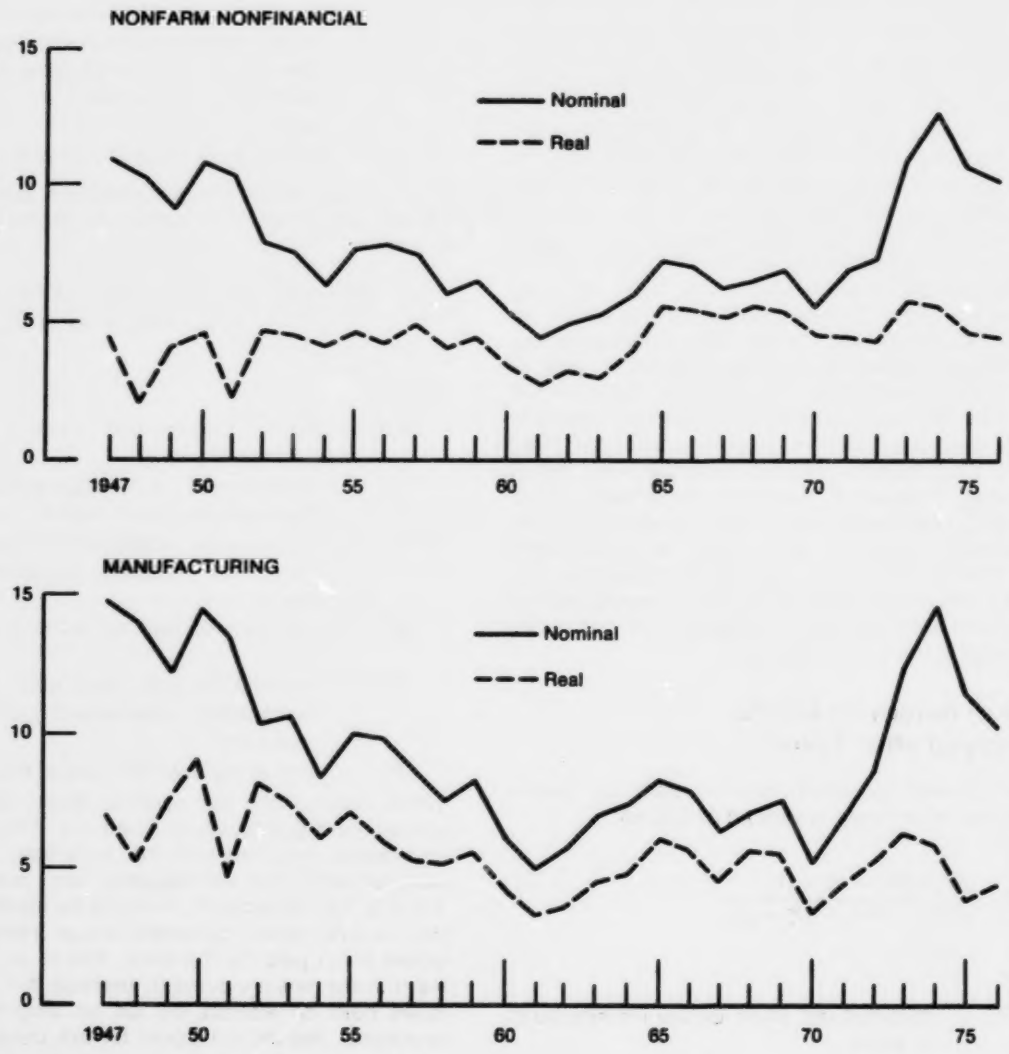
These nominal and real rates of return, after taxes, are reported graphically in Chart 4-1. The numerical equivalents, together with the numerical, before-tax nominal and real counterparts, are presented in Table C-1 in Appendix C. It should be mentioned that the income taxes deducted above represent the actual taxes paid by the firms. This is an overstatement in the present context, because it includes the taxes paid on interest earned on long-term loans receivable. We did not adjust for this because of the difficulties involved in estimating the appropriate

aggregate annual tax rates over a 30-year period. The nominal and real after-tax rates of return on capital employed are therefore slightly understated, but their trend over the interval and the relationship between the two are probably unaffected.

A more systematic analysis of the variations in real rates of return on capital employed is presented below, so only a few brief observations will be offered here. As might have been expected, nominal and real after-tax rates of return on capital employed varied together, with very few exceptions, over the 30 years reported. Also, again as might have been expected and without referring to specific cyclical indicators (this is done later), these rates of return tended to fluctuate with the business cycle. Of special interest is

Chart 4-1

Nominal and Real After-Tax Rates of Return on Capital Employed, 1947-76



the size of the gap between nominal and inflation-adjusted rates of return. It was always considerable and often very large, and the variations in its magnitude may be attributed primarily to those in the rate of inflation and to the intermittent changes in tax rules that were introduced at various points during the interval.

Since it has a considerable currency in the literature, the real after-tax rates of return on capital as defined "conventionally" are also presented (Table 4-1). It may be defined as follows:

Table 4-1

Real After-Tax Rates of Return on Capital "Conventional" Method, 1947-76

	Nonfarm, nonfinancial sector	Manufacturing sector
1947	5.74	8.91
1948	3.63	6.95
1949	5.35	9.50
1950	5.52	11.01
1951	3.45	6.34
1952	5.53	9.55
1953	5.29	8.81
1954	4.99	7.52
1955	5.78	8.81
1956	5.53	7.55
1957	6.13	6.55
1958	5.06	6.56
1959	5.51	7.03
1960	4.33	5.31
1961	3.86	4.33
1962	4.35	5.10
1963	4.02	6.31
1964	4.89	6.61
1965	7.25	7.96
1966	6.91	7.33
1967	6.49	6.19
1968	7.14	7.52
1969	7.02	7.45
1970	6.04	4.95
1971	5.44	5.88
1972	5.12	6.47
1973	6.73	8.05
1974	6.16	6.71
1975	5.22	4.61
1976	5.38	5.28

$$RC_i^c = \frac{RP_i - DV_i + BD_i - RD_i + INT_i - CSADJ_i - IT_i}{INV_i + RK_i + RL_i},$$

where

INT_i = net interest expense.

Rate of Return on Net Worth after Taxes

Net worth (equity) is simply capital employed less net noncurrent liabilities. It must be recognized, however, that the rate of return on net worth that is reported below is a somewhat ambiguous indicator and not the one that we would have chosen had the exigencies of our data been otherwise. This is because there generally exist various classes of shareholders in the firm, ranging from the common shareholders, who are the most truly residual claimants to its profits, to the several possible types of preferred shareholders. It is the rate of return on the equity held by the common shareholders that we would have preferred to estimate. Our data did not, however, permit differentiation between these groups of shareholders. If it had done so, it would have been necessary to take account of the fact that inflation induces real transfers between the holders of the firm's preferred shares and the holders of its common shares, in ways that are analogous to the real transfers induced between creditors and shareholders that were discussed above. Because this was not possible, the rate of return on net worth was calculated. Although it must be regarded as a second-best alternative, it remains an indicator of considerable interest, if for no other reason than it gives, in its real version, a sense of the transfers between creditors and shareholders. It is defined in nominal after-tax terms as follows:

$$NRNW_i = \frac{RP_i - DV_i - IT_i}{INV_i + OWC_i + BK_i + BL_i - NCL_i},$$

where

NCL_i = net noncurrent liabilities at mid-year i.

The real rate of return on net worth after taxes is defined as follows;

$$RRNW_i = \frac{RP_i - DV_i + BD_i - RD_i - CSADJ_i \pm WC_i + GL_i - IT_i}{INV_i + OWC_i + RK_i + RL_i - NCL_i},$$

where

GL_i = gain on net noncurrent liabilities in year i.

These nominal and real rates of return, after taxes, are presented graphically in Charts 4-2 and 4-3. The numerical equivalents, together the numerical, before-tax nominal and real rates of return on net worth, are presented in Tables C-2 and C-3 in Appendix C. In general, and given stable prices, the difference between the rate of return on capital employed earned by a firm and the rate of return on its net worth will be determined largely by the relationship between the former and the average annual rate of interest that the firm paid on its net noncurrent

debt. The advent of unanticipated inflation (or deflation), however, causes, as has been shown, real transfers to take place between the firm's creditors and its shareholders. It is thus reasonable to attribute to two basic factors the fact that real after-tax rates of return on net worth in both of the aggregate sectors reported were invariably greater than corresponding real after-tax rates of return on capital employed. We cannot, however, easily differentiate between them. One factor is the net return that firms earned on borrowed resources; the other is the gains that shareholders earned at the expense of creditors, as actual inflation consistently turned out, apparently, to be higher than had been anticipated and reflected in interest rates. Since the effects of unanticipated inflation are reflected in the real, but not in the nominal, rates of return on net worth, it is not surprising that these two rates of return have not varied together as closely as did the corresponding rates of return on capital employed. As to the variations in the real after-tax rate of return on net worth, we have not attempted to analyse them, but it seems not unlikely that they, too, were influenced by the cyclical factors that are identified as having contributed to the variations in the real after-tax rates of return on capital employed.

Chart 4-2

Nominal and Real After-Tax Rates of Return on Net Worth: Nonfarm, Nonfinancial Sector, 1947-76

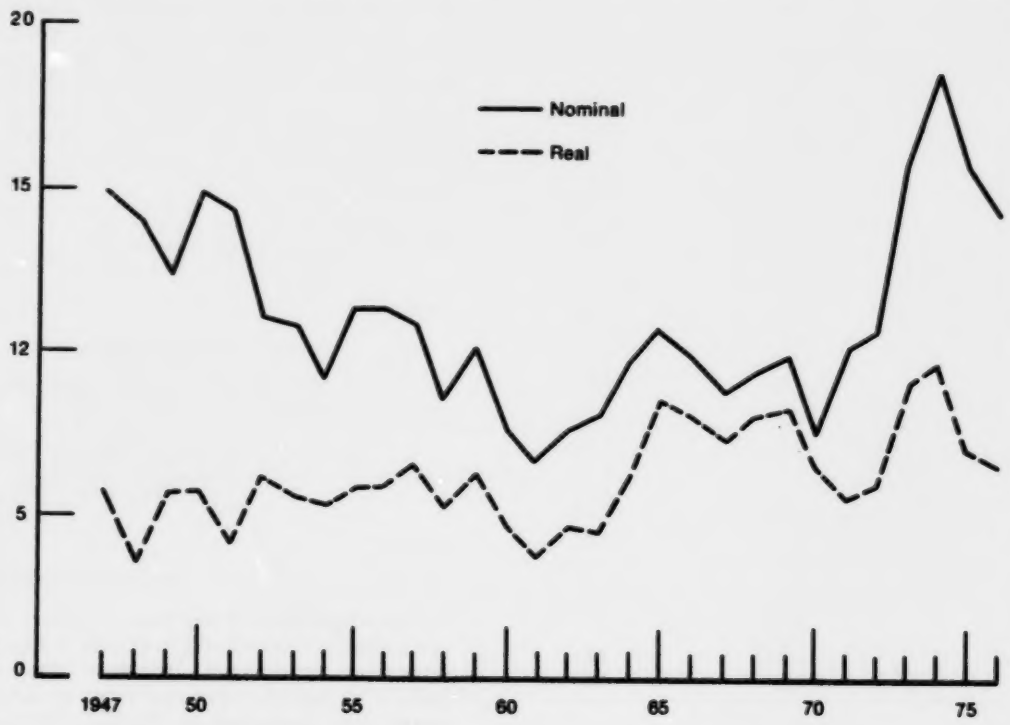
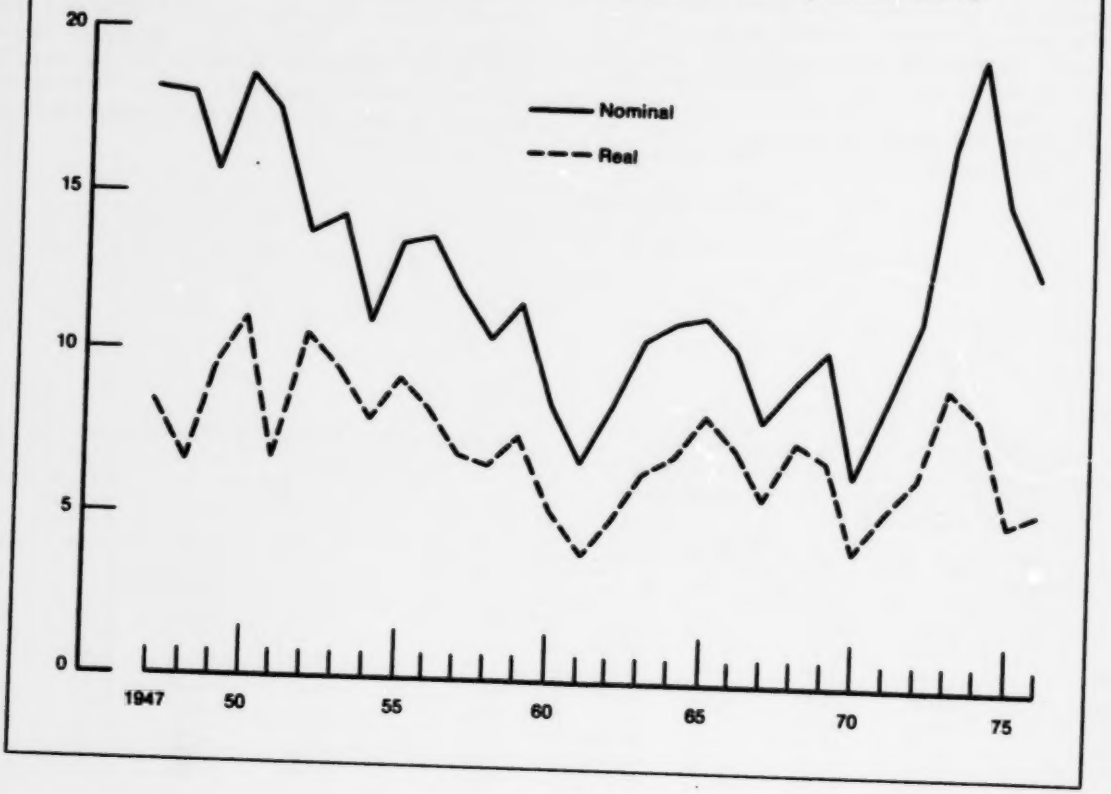


Chart 4-3

Nominal and Real After-Tax Rates of Return on Net Worth: Manufacturing Sector, 1947-76



Effective Tax Rates and Dividend Payment Ratios

The effective tax rate reported in Table 4-2, in both nominal and real terms, is defined as the ratio of the annual income taxes paid to the corresponding nominal and real before-tax profits, respectively.[4] Similarly, the dividend pay-out ratio is defined as the ratio of annual dividends declared to after-tax profits. These ratios are reported, in nominal and real terms, in Table 4-3.

Considerable caution should be exercised when discussing the effective tax rates paid by large aggregates, such as the two sectors dealt with here, over a long interval. The main problem is that the mix of relevant factors has tended to change over the years, with the result that superficial trends and comparisons can be misleading if taken at face value. Not only did a variety of changes in tax rules take place over the years, ranging from changing tax rates through investment tax credits of various kinds to inventory valuation adjustments and changing depreciation rates, but so did the mix of small and large firms in the sample, each subject to different tax rates. All of this is in addition to the data problems involving the years 1965 to 1970, inclusive, described in Appendix B. Consequently, the only observation that we can make with confidence regarding the effective tax rates reported is that failure to adapt Canadian tax rules to the realities of an inflationary era has meant that the effective tax rates that a great many firms ostensibly paid were considerably less than those that they actually paid.

The trends of the aggregate dividend pay-out ratios reported must also be contemplated with caution. This is partly because the mix of larger firms that pay dividends and the (much more numerous) smaller firms that do not tends to vary over time and partly because dividends declared in a given year depend upon a variety of factors, of which current profits is only one. Contractual factors affecting preferred shares, as well as past years' profits and dividends, and the exigencies of the stock market also have a bearing upon the dividends declared by firms. As before, what is particularly striking is the fact that the proportions of current profits that many firms ostensibly distributed to shareholders in dividends is very substantially less than what they distributed in reality. Indeed, it would not be unwarranted to suggest that some, and perhaps quite a few, of the firms paid out in dividends, at least during some years of high inflation, more than they really earned during those years. In other words, they distributed capital, wittingly or unwittingly. To round off the statistical picture, Chart 4-4 reports the annual increments to retained earnings, expressed as a percentage of real before-tax profits.

Table 4-2

Nominal and Real Effective Tax Rates, 1947-76

	Nonfarm, nonfinancial sector		Manufacturing sector	
	Nominal	Real	Nominal	Real
	(Per cent)			
1947	29.86	44.87	29.48	43.71
1948	31.86	57.37	30.40	48.01
1949	32.40	43.86	31.46	38.00
1950	32.76	48.39	32.49	39.59
1951	42.04	64.94	41.83	59.60
1952	47.25	54.37	45.42	46.12
1953	43.83	53.97	41.18	46.08
1954	41.22	48.75	41.80	45.44
1955	38.70	49.16	39.65	44.59
1956	38.80	49.67	39.01	47.05
1957	33.69	40.38	35.48	44.24
1958	35.31	42.72	34.97	41.35
1959	36.53	43.35	37.16	43.65
1960	41.42	49.23	41.91	49.68
1961	44.55	53.94	45.90	55.80
1962	41.57	49.31	42.87	51.88
1963	41.07	50.66	37.75	45.58
1964	37.91	44.18	36.51	43.47
1965	40.74	46.41	44.39	52.08
1966	39.76	44.90	43.07	51.74
1967	39.97	44.90	44.57	52.82
1968	41.22	45.81	44.46	50.84
1969	39.78	45.12	43.90	52.82
1970	43.78	47.50	47.92	59.13
1971	35.49	43.85	41.31	49.46
1972	36.02	45.09	37.68	46.43
1973	31.22	39.15	32.25	43.01
1974	32.28	41.26	31.80	46.60
1975	33.59	44.04	33.14	51.87
1976	33.15	43.22	33.99	46.77

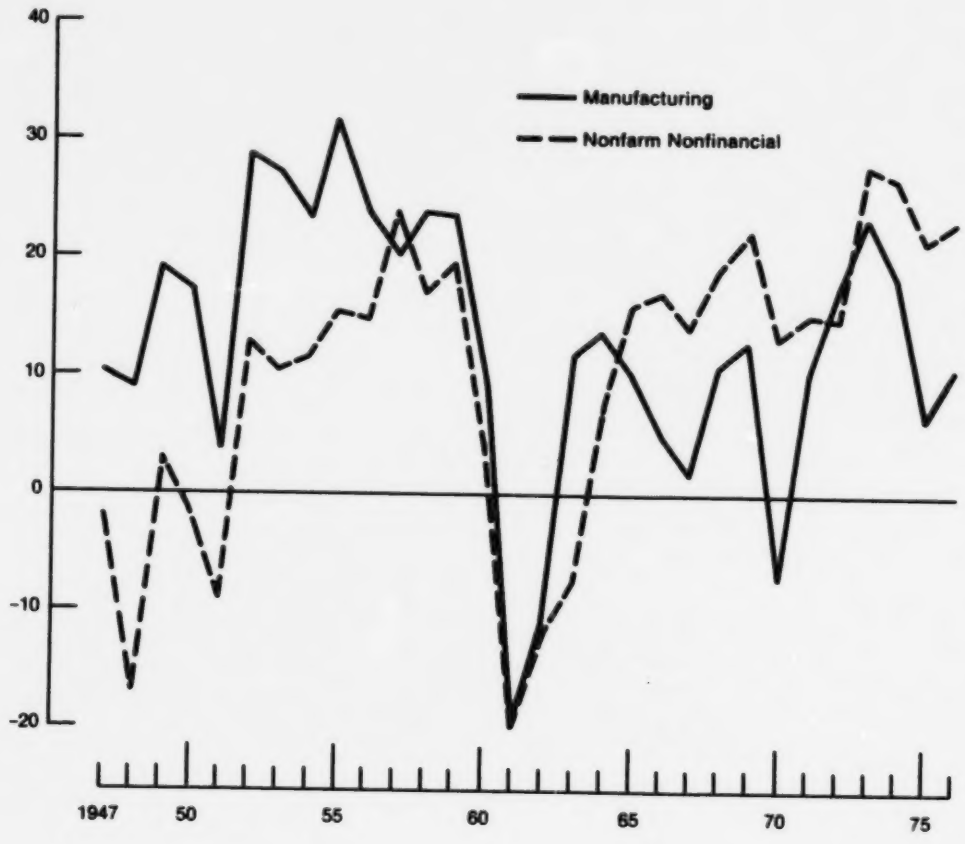
Table 4-3

Nominal and Real Dividend Pay-Out Ratios, 1947-76

	Nonfarm, nonfinancial sector		Manufacturing sector	
	Nominal	Real	Nominal	Real
	(Per cent)			
1947	53.98	103.22	44.21	82.12
1948	48.42	139.39	38.98	82.39
1949	58.38	95.15	51.60	68.89
1950	53.82	103.58	51.99	70.82
1951	49.20	125.64	44.03	90.32
1952	53.72	71.47	44.77	46.04
1953	51.30	77.09	39.89	48.70
1954	57.03	77.36	49.07	56.90
1955	45.91	70.33	35.01	42.87
1956	45.30	70.49	39.23	54.50
1957	44.87	59.83	43.97	63.45
1958	51.37	70.20	45.32	59.41
1959	49.20	65.40	44.41	58.19
1960	66.75	91.57	58.93	80.63
1961	97.96	142.78	97.27	144.72
1962	90.32	123.52	85.56	122.93
1963	77.93	114.80	56.49	78.02
1964	67.28	87.21	56.36	75.36
1965	53.46	70.24	57.74	78.60
1966	55.96	69.08	63.14	89.47
1967	60.42	73.94	69.20	96.34
1968	53.52	64.51	60.55	78.22
1969	47.65	59.29	46.76	71.91
1970	64.55	74.99	74.87	117.76
1971	51.41	72.98	57.02	79.27
1972	49.92	72.81	46.80	67.09
1973	37.57	53.84	37.66	58.64
1974	36.87	54.33	34.90	65.42
1975	38.88	61.64	39.86	86.65
1976	38.63	59.31	46.69	79.65

Chart 4-4

Annual Incremental Retained Earnings as a Percentage of Real Before-Tax Profits, 1947-76



Part 2

5 Movements in the Ex Post Real Rate of Return

Some of the series of real rates of return presented and discussed in the previous pages have been subjected to econometric analysis so as to shed some light on their movements over time and on the possible underlying factors. In econometric analysis of this kind, two types of analyses may be distinguished.

In one approach, estimable functions are derived on the basis of economic theory. It is customary to start from well-established microeconomic theory that sees profits as dependent upon all output and input prices. While this would be a valid approach for sectoral profits, problems arise in the case of aggregate profits. The outputs of one firm are the inputs of another, and prices that help explain the profits of both are netted out in aggregation. The explanatory elements that remain, especially labour cost, cannot be regarded as independent of profits in the macroeconomy. It is, therefore, necessary to introduce a theory of the dynamics of income shares; this is a general equilibrium problem that has given rise in the literature to a variety of approaches. Of course this argument applies more to nonfinancial corporations than to the manufacturing sector, although the latter is a borderline case. In short, the theoretical development needed is on the scale of that required for a large disaggregated model like CANDIDE, the difference being that the specification has to be condensed to a single equation.

A more simple and direct approach to the econometric analysis of time series of real rates of return consists of testing for the presence of trends and cyclical variation, and for the influence of broad economic indicators such as inflation, productivity, and competitive position. An examination of this type is only a first cut at empirical analysis. It serves mainly to dispel simplistic views about the economy, while occasionally, if a significant relation is found, it may spur further investigation. The presence of a robust trend, for instance, may indicate a gradual structural change in the economy. Alternatively, it may be found that some observations of the real rate of return deviate sharply from the historical pattern. For example, recent work in the United States along these lines has sought to determine whether the rate of profit has been falling.[1] This study follows this second approach to the econometric analysis of the rate of return.

Regressions were run for the before- *and* the after-tax rates of return on *capital employed*, for both nonfinancial and manufacturing corporations. Although firms presumably aim at maximizing after-tax returns on net worth, these are subject to changes in taxation rules and in financial structure, which in the short run may have a significant influence on net returns. We did not attempt to model these complex factors, but we did examine the influence of general economic conditions, which are probably most clearly reflected in the before-tax rate of return on capital employed. Goodness of fit was generally superior for the before-tax rate of return, which seems to lend some support to this view.

Our main result is straightforward: there is a fairly strong and robust downward trend in the real aggregate rate of return of corporations in the manufacturing sector. Otherwise, only business cycle indicators have a significant and robust effect upon the real rate of return on capital employed, both for manufacturing corporations and for all nonfinancial corporations. All other variables tested for proved to be either insignificant or far from robust, and it has to be concluded that they have no direct influence on the real rate of return.

To repeat, one of our most unambiguous findings is a significant downward trend in the real rate of return in manufacturing. No other variable seems to describe nearly so well the secular pattern of historically high real rates of return during the 1950s. Judging from the pattern of residuals, a nonlinear trend, close to zero in later years, would give a better fit. Perhaps this reflects specific circumstances in the 1950s and 1970s – the former being unusually favourable, the latter unusually unfavourable – that are not reflected in the explanatory variables for which we tested. No such trend is present in the real rate of return on the capital employed in nonfinancial

corporations, of which manufacturing accounts for a substantial share. This indicates that a rising trend occurred in the real rates of return in nonmanufacturing corporations. It is a plausible assumption that changes in the relative price of energy had some influence.[2]

Our second finding is that cyclical variables have substantial explanatory power. The output-gap measures developed in Chapter 1 of the *Sixteenth Annual Review* performed well, but a second indicator – the difference between the actual and the equilibrium unemployment rate – obtained from the same source consistently performed better. This was unexpected, since an output-based indicator should, in principle, be a better proxy for the degree of utilization of a firm's resources and hence for its real return on capital. Allowing for a lagged effect of the cyclical variable improved the goodness of fit – also a somewhat surprising result. The coefficients on the cyclical variables were consistently larger for before-tax real rates of return than for after-tax rates, reflecting the smoothening effect of corporate taxes. The real rate of return in manufacturing was found to have a larger cyclical amplitude than did the real rate of return in the nonfinancial corporate sector.

The rate of growth of output and the rate of growth of output per employed person proved to be very poor substitutes for these cyclical indicators. They obviously have a cyclical content, and they also reflect medium-term or structural changes in the rate of growth of the economy, but they were consistently insignificant in our regressions.

A third group of variables, representing Canadian prices or costs relative to those of our trading partners, also proved insignificant. For the nonfinancial corporations as a whole, the ratios of export and import prices to domestic prices were expected to have a positive influence on real profits, on the grounds that corporations may respond to changes in the trading environment by making price adjustments, in addition to making quantity adjustments that are reflected in the cyclical variables. The same reasoning underlay testing for an independent effect of the relative unit labour cost (U.S. vs. Canada) upon manufacturing. Neither hypothesis proved tenable.

Changes in the terms of trade have a direct impact on the amount of real income available in the economy. A direct effect upon the real rate of return may therefore be hypothesized. In our regressions we found a small effect upon the nonfinancial sector as a whole but not upon the manufacturing sector. The explanation for this may lie in the structure of Canada's foreign trade. Manufacturing firms experience competition from imports but account for only a moderate share of exports and are therefore unlikely to be the initial beneficiaries of an improvement in the terms of trade. Canadian producers of resource products are in a better position, especially when terms-of-trade improvement involves a rise in export prices.

We found no convincing evidence of a direct effect of inflation upon real rates of return, whether positive or negative. The change in the rate of inflation showed a negative effect; this, however, was small and generally insignificant.

$$BUT = \underset{(28.5)}{8.38} + \underset{(1.6)}{.028}TIME - \underset{(4.8)}{.70}UGAP - \underset{(2.1)}{.28}UGAP_{-1}$$

$$- \underset{(1.9)}{1.42}D51 \quad \bar{R}^2 = .75 \quad DW = 1.59 \quad SEE = .66$$

$$RAT = \underset{(18.6)}{4.33} + \underset{(3.0)}{.041}TIME - \underset{(3.0)}{.34}UGAP - \underset{(1.6)}{.17}UGAP_{-1}$$

$$- \underset{(4.3)}{2.58}D51 \quad \bar{R}^2 = .68 \quad DW = 1.37 \quad SEE = .52$$

$$BUM = \underset{(26.3)}{13.22} - \underset{(4.8)}{.143}TIME - \underset{(7.6)}{1.36}UGAP - \underset{(1.5)}{1.94}D51$$

$$\bar{R}^2 = .76 \quad DW = 1.55 \quad SEE = 1.15$$

$$RAM = \underset{(21.5)}{7.55} - \underset{(4.8)}{.099}TIME - \underset{(6.1)}{.76}UGAP - \underset{(4.0)}{3.53}D51$$

$$\bar{R}^2 = .69 \quad DW = 1.50 \quad SEE = .80$$

Estimation Period: 1950-76

- *BUT* = before-tax rate of return on capital employed: nonfarm, nonfinancial sector;
- *RAT* = after-tax rate of return on capital employed: nonfarm, nonfinancial sector;
- *BUM* = before-tax rate of return on capital employed: manufacturing sector;
- *RAM* = after-tax rate of return on capital employed: manufacturing sector;
- *TIME* = linear trend 1950 = 1;
- *UGAP* = difference between actual and equilibrium unemployment rate; and
- *D*51 = dummy for 1951 (Korean crisis).

Our finding of an absence of strong systematic influences, other than a trend for manufacturing and cyclical indicators, upon real rates of return may point to a healthy capacity on the part of firms to adapt to changes and disturbances. It must be admitted, however, that our data do not cover the whole decade of the 1970s, which differed in so many ways

from the generally stable and favourable earlier postwar period. Although we have not found evidence of serious erosion of profitability, the continuing experience of stagflation in years subsequent to our sample may yet prove damaging.

Our findings show, however, that simple, sweeping assertions about the ills afflicting the economy tend to have little basis in fact. Inflation, acceleration of inflation, the slowdown in productivity growth – none of these has had a direct influence upon real rates of return. The factors that may well have to be introduced in order to better understand the impacts of these phenomena are their respective sources. Excess demand inflation, for example, will probably have a very different effect upon real rates of return than inflation emanating from the supply side. By the same token, the effects of changes in the terms of trade will differ according to whether they arise from changes in international markets or from domestic economic conditions. Refinements along these lines may yield more complete explanations of the determinants of the real rate of return.

Appendixes

A Recent Analogous Research in Canada and the United States, and their Methodologies

Canadian Studies

Jenkins (1977*a*) is an exercise in measuring the social and private rates of return on capital and equity in Canada for the period 1965 to 1974, inclusive. As indicated earlier, his definition of capital is somewhat different from our definition, but the main difference between his study and ours lies in the methodology used to calculate the (private) rate of return on net worth. In calculating this rate of return no adjustment is made in his study for the effects of inflation upon the firms' debts. The need to make such an adjustment is recognized in Jenkins (1977*b*), which is a study of the various real transfers induced by inflation between different sectors of the Canadian economy, including the government sector, and especially between debtors and creditors. The interval examined is again 1965 to 1974, inclusive. If conceived in ex post terms, the conceptual nature of the adjustments to conventional accounts necessitated by inflation corresponds to that of the adjustments made in our study.

The only other research of this type published in Canada that we know of is that of Basu and Hanna (1976), Belanger and McIlveen (1980), and Bossons (1977). The first of these is an exercise in general price level accounting, whereby a single price index is used to re-estimate certain firms' financial statements for the years 1967 to 1973, inclusive, in order to adjust for inflation. Although rates of return are calculated on total assets and common equity instead of on capital and net worth and subject to this being an exercise in general price level accounting, the nature of the specific adjustments for inflation is, on the whole, compatible with that of our adjustments. The second study (prepared concurrently with ours) reports inflation-adjusted aggregate rates of return on net worth for the years 1963 to 1979, inclusive, for the nonfinancial, manufacturing, energy sectors and for the nonmanufacturing, other, nonenergy sectors. The methodology used to adjust reported figures for inflation is the same as ours. As for the third study, which covered the years 1971 to 1975, inclusive, inflation-adjusted rates of return are calculated on capital employed and common equity for several industry groups. Except for two important differences, the adjustment methodology adopted in that study has much in common with our methodology. The most important difference is this: instead of making the kind of debt adjustment that we make, the sum of the depreciation and cost-of-sales adjustments is reduced by the proportion that net debt bears to total nonmonetary, depreciated assets at replacement cost, and this reduced amount is deducted from reported profits. It is noteworthy that in an update of this exercise, to be published in the near future, Bossons discontinued this device and makes the same type of debt adjustment that we do. The other difference – by no means insignificant – between this exercise and ours (as well, apparently, as all others concerned with rates of return on capital) lies in the calculation of the after-tax rate of return on capital. Bossons, in effect, offsets the tax savings that firms realized by virtue of the fact that net interest expense is deductible from taxable income.

It would appear, then, that although our study is unique in a Canadian context – to the extent that we report over a much longer interval than does any other study, especially with regard to our estimates of aggregate real rates of return on capital employed – our methodology has considerable support in the work of other researchers in the field. This methodological support is also evident in the work relating to the U.S. economy identified below.

U.S. Studies

Published U.S. studies are more numerous than Canadian ones, and they are only reviewed cursorily. Nordhaus (1974) reports real shares of capital income in total corporate income and, more pertinently to our purposes, real rates of return on corporate capital. Capital is measured "conventionally" in this study, as it is in all the U.S. studies that we know of, but the methodology of the adjustment for infla-

tion is similar to ours. Shoven and Bulow (1975) and Shoven and Bulow (1976) do not report rates of return. Also, they prefer the Haig-Simons purchasing-power-accrual approach to income to the capital-maintenance approach that we favour. Hence they take up capital gains that we do not. Otherwise their adjustments for inflation are very similar to ours. Tideman and Tucker (1976) also do not deal with rates of return as such, but their discussion of the types of adjustments to reported income necessitated by inflation corresponds closely to ours. Feldstein and Summers (1977) report pre-tax real rates of return on capital after making the usual adjustments for inflation. Lovell (1978) also makes the usual adjustments for inflation in reporting real rates of return on equity, but in a spirit that is basically similar to that of Shoven and Bulow. Kopcke (1978) reports real rates of return on capital in the usual fashion. He also reports real rates of return on equity, but he does not make the type of debt adjustment that we and others make. He acknowledges, however, that failure to make some such adjustment understates real rates of return on equity.

It is worth mentioning that, apart from the avowed general-price-level accounting exercise of Basu and Hanna, all of the studies cited use, as we do, various specific indexes to adjust specific assets and liabilities. (Though specific, these indexes are not, of course, necessarily common to all the studies.)

While it is, once again, evident that the methodology adopted in this study is very much in the mainstream of the recent Canadian and U.S. literature in the field, there are some differences. These, however, are for the most part minor; our particular views are developed in detail in the text. It is somewhat surprising that probably the most important difference between our approach and that of a small minority of the above-mentioned studies concerns debt adjustment, since this would seem to be one of the more straightforward inflation adjustments, both conceptually and practically.

B Notes on Data and Adjustment Methodology

Primary Data Sources

(a) Department of National Revenue, *Taxation Statistics*.
1965-76 Statistics Canada, *Corporation Financial Statistics* (Cat. 61-207).
(b) Statistics Canada, *Fixed Capital Stocks and Flows* (Cat. 13-211).

Sample of the Corporations Reported in Taxation Statistics and in Corporation Financial Statistics

- 1947-55 Virtually all corporations that filed income tax returns.
- 1956-58 All corporations reporting total assets of $500,000 or more, or profits of $25,000 or more; a 10 per cent stratified sample of the others.
- 1959-64 All corporations reporting total assets of $1 million or more, or profits of $50,000 or more or, after 1960, losses of $25,000 or more; a 10 per cent stratified sample of the others.
- 1965-68 All corporations reporting net assets of $5 million or more, 50 per cent of corporations reporting net assets between $1 million and $5 million, and a 5 per cent stratified sample of the others.
- 1969-71 All corporations reporting net assets of $1 million or more, a 10 per cent stratified sample of corporations reporting net assets in excess of $250,000 or sales in excess of $500,000, and a 5 per cent stratified sample of the others.
- 1972-73 Virtually all corporations reporting net assets in excess of $5 million, sales in excess of $5 million or profits or losses in excess of $250,000; a 5 per cent stratified sample of the others.
- 1974-76 All corporations with assets in excess of $5 million and a stratified sample of the others.

The income and balance sheet data provided by the sources in (a) above are in terms of fiscal year end. The fiscal years of some corporations do not correspond to the calendar year. Since the various deflators used in the inflation adjustments are annual ones, this may impart a slight downward bias to the real earnings and real rates of return for the years during which inflation was relatively high.

Crown Corporations

Prior to 1965, the Department of National Revenue excluded Crown corporations from the taxation statistics. From 1965 to 1970, however, Statistics Canada included federal proprietary Crown corporations in the financial statistics; thereafter, agency Crown corporations and provincial and municipal Crown corporations were also included.

Very little information is available regarding the proprietary Crown corporations for the years 1965 to 1969, inclusive. The data for 1970 is much more complete, but the sectoral breakdown does not permit separatin the financial Crown corporations from the nonfinancial. In order to deal with this problem with respect to these six years, reference was made to the analogous analysis in Belanger and McIlveen (1980), based upon a sample of corporation financial statistics that excluded Crown corporations; and an admittedly rough scaling adjustment was made to our results. While the adjusted rates of return are plausible for the nonfarm, nonfinancial sector, we are somewhat uncomfortable about those for the manufacturing sector. The possibility cannot be excluded that these adjusted rates of return are slightly too high. We doubt, however, whether the upward bias during these six years is sufficient to affect the long-term trends.

Statistics Canada was able to provide additional information for the years 1971 to 1976, inclusive, which made it possible to remove Crown corporations from the sample for those years.

Income Taxes: Payable and Deferred

Income taxes paid in each year is the provision for current taxes payable for that year. Each year's closing balance of deferred income taxes was regarded as part of that year's equity. This item generally derives from the difference between book depreciation expense and the capital cost allowances used for income tax purposes. Consequently, as long as the firm engages in capital formation at a steady or increasing rate, this amount will probably never be paid. A problem arose, however, with respect to the years 1965 to 1970, inclusive, because the data did not permit distinguishing between current taxes payable and deferred taxes. Since no satisfactory way could be found to estimate the deferred taxes for these years, no adjustment was made. Hence taxes paid and the effective tax rates during those years are overstated, as are dividend pay-out ratios. But given the above adjustment with respect to Crown corporations, which had the effect of scaling the results on the basis of data that are free of this problem, it is likely that the estimates of after-tax rates of return were not adversely affected to a significant extent.

1965 Data

The data for the year 1965 constitute a problem. This is the first year of the *Corporation Financial Statistics* series, and Statistics Canada reports that it is not fully compatible with the preceding series. We have been informed, however, that although the 1965 data have never been revised, the problems that occurred in relation to that year were largely resolved during the following years.

The Depreciation Adjustment

In order to estimate accurately the replacement cost of depreciable assets and replacement cost depreciation, it is necessary to know when investments were made and when old assets were written off. As well, for the starting year of the analysis (1947), it is necessary to know the age distribution of the depreciable assets held at that time so that the replacement cost for that year can be accurately estimated.

While *Taxation Statistics* and *Corporation Financial Statistics* (the main data sources) provide some of this information, they are by no means complete for the following reasons:

1 *Taxation Statistics* start in 1947; thus we do not know the age distribution of depreciable assets held in that year.

2 More generally, *Taxation Statistics* and *Corporation Financial Statistics* do not deal with write-offs (and write-ups) in a systematic manner.

For these reasons it was decided to make use of the so-called "perpetual inventory" technique to build up gross and net capital stocks. It is this computational technique that is used in the estimates reported in *Fixed Capital Stocks and Flows*. This approach has the added advantage that the computational technique makes it relatively simple to compute replacement cost figures with and without backlog depreciation. The method involves the accumulation of gross investment over a period of years in order to obtain the gross depreciable assets in a given year. The technique also generates estimates of the depreciation expense for each year. In order to compute the replacement values of gross fixed assets, net fixed assets, and depreciation expense, price indexes are needed for each sector. These indexes are available from *Fixed Capital Stocks and Flows*.

Estimation of Average Asset Life

As a first step, it was necessary to estimate average asset life (the asset lives given in *Fixed Capital Stocks and Flows* seemed too long). Average asset life is defined as follows:

$$L_i = \frac{GDA_i}{BD_i},$$

where

L_i = average asset life of total depreciable assets in year i;
GDA_i = gross depreciable assets at the end of year i;
BD_i = book depreciation expense in year i.

A problem arose with regard to the years 1947-64. The data source for those years, *Taxation Statistics*, does not report book depreciation expense. Instead, capital cost allowances used for income tax purposes are reported. These were probably always substantially greater than book depreciation expense and therefore could not be used for the above purpose. (When capital cost allowances were used to estimate average asset life, the results were implausibly low.) Since *Corporation Financial Statistics* reported book depreciation expense for the years 1965-76, these twelve observations were used to calculate L^* as an unvarying estimate of L_i. L^* turned out to be 19 years for both sectors.

Since there is some evidence that asset lives have been getting shorter in recent decades, 19 years may be an underestimate. This figure was used, however, because no better estimate was readily available.

Derivation of the Investment Series

In developing the investment series, it was necessary to distinguish between the pre-1947 period and the post-1947 period. It was not possible to obtain from *Fixed Capital Stocks and Flows* an investment series that was consistent with *Corporation Financial Statistics*. Two of the reasons for this are:

1 The data in *Fixed Capital Stocks and Flows* are collected on an establishment rather than on a corporate basis; and

2 *Corporation Financial Statistics* refer in certain years to non-Crown corporations while *Fixed Capital Stocks and Flows* include both Crown corporations and unincorporated firms.

The investment series for the 1947-76 period was therefore calculated from *Taxation Statistics* and *Corporation Financial Statistics* as follows:

$$x_i = NDA_i - NDA_{i-1} + BD_i,$$

where

x_i = gross investment in year i; and
NDA_i = net depreciated assets in year i.

Book depreciation expense had to be estimated for the years 1947-64. This was done by dividing gross depreciable assets at the end of each year by 19, the estimated average useful life of these assets.

In order to calculate the replacement value of the stock of depreciable assets held at the start of 1947, it was necessary to have an annual investment series, which begins in 1927. Since the *Taxation Statistics* series does not go back that far, it was necessary to adapt the pre-1947 data provided in *Fixed Capital Stocks and Flows*. This was done by scaling the annual investment figures in the latter publication on the basis of the average ratio of the two investment series for the years for which both are available.

Estimation of Replacement-Cost Gross and Net Depreciated Assets and Depreciation Expense

This was done using the methodology described in the *Fixed Capital Stocks and Flows* (Cat. 13-522). Details of the methodology used in computing backlog depreciation can be obtained from the authors upon request.

The capital stock series, based on the perpetual inventory data contained in *Fixed Capital Stocks and Flows* are mid-year estimates; however, the data contained in *Taxation Statistics* and *Corporation Financial Statistics* represent year-end figures. Thus we have the following definitions:

Financial statistics

$$BD_i = \frac{GDA_i}{L^*} = \frac{1}{L^*} \sum_{j=i-L^*+1}^{i} x_j$$

Perpetual inventory

$$BD_i = \frac{1}{2L^*}(x_i + x_{i-L^*}) + \frac{1}{L^*} \sum_{j=i-L^*+1}^{i-1} x_j.$$

Since annual investment, x_i, tended to rise consistently over the long interval, reliance upon the perpetual inventory methods results in the underestimation of annual depreciation expense and, therefore, of accumulated depreciation. Consequently, net depreciated assets are overestimated. In order to correct for these biases, the estimates of annual depreciation expense and annual net depreciated assets were both scaled on the basis of the annual ratios of the figures in *Corporation Financial Statistics* to the corresponding figures in *Fixed Capital Stocks and Flows*.

C Supplementary Tables

Table C-1

Nominal and Real Rates of Return on Capital Employed, 1947-76

	Before tax				After tax			
	Nonfarm, nonfinancial sector		Manufacturing sector		Nonfarm, nonfinancial sector		Manufacturing sector	
	Nominal	Real	Nominal	Real	Nominal	Real	Nominal	Real
	(Per cent)							
1947	15.68	8.12	21.01	12.48	11.17	4.49	14.95	7.11
1948	15.11	5.84	20.12	10.30	10.49	2.15	14.13	5.10
1949	13.33	7.60	17.82	12.42	9.16	4.26	12.31	7.69
1950	16.12	8.70	21.46	14.92	11.00	4.59	14.62	9.08
1951	17.44	8.05	23.00	12.90	10.34	2.34	13.55	4.87
1952	14.62	10.03	18.66	15.30	8.00	4.60	10.42	8.27
1953	13.26	9.16	17.63	13.74	7.73	4.51	10.60	7.63
1954	10.77	7.71	13.84	11.11	6.62	4.15	8.31	6.22
1955	12.48	8.58	16.18	12.69	7.93	4.62	10.00	7.24
1956	12.54	8.26	15.98	11.37	7.96	4.25	9.97	6.04
1957	11.08	7.97	13.33	9.37	7.60	4.90	8.82	5.36
1958	8.99	6.52	11.42	8.55	6.11	3.96	7.66	5.18
1959	10.32	7.51	12.92	9.73	6.87	4.45	8.36	5.62
1960	8.40	6.25	10.21	7.72	5.28	3.44	6.19	4.08
1961	7.40	5.58	8.75	6.56	4.46	2.91	5.00	3.16
1962	7.98	5.92	9.84	7.30	4.99	3.21	5.87	3.70
1963	8.21	5.81	11.20	8.32	5.17	3.06	7.20	4.68
1964	9.22	6.79	11.45	8.51	6.04	3.92	7.49	4.93
1965	11.62	8.69	14.36	10.81	7.28	5.68	8.26	6.19
1966	11.31	8.39	13.68	10.08	7.19	5.66	8.07	5.85
1967	10.16	7.64	11.07	8.24	6.48	5.21	6.43	4.70
1968	10.74	8.39	12.36	9.88	6.73	5.68	7.22	5.89
1969	10.97	8.20	13.21	10.07	7.01	5.53	7.77	5.81
1970	9.25	7.00	9.36	6.67	5.67	4.55	5.26	3.41
1971	10.48	7.19	11.31	8.42	7.15	4.27	7.01	4.53
1972	11.14	7.35	13.21	9.43	7.56	4.20	8.58	5.24
1973	15.40	9.69	18.01	11.56	11.02	5.87	12.50	6.64
1974	18.29	10.41	21.24	11.52	12.80	5.80	14.79	6.00
1975	15.77	8.51	16.71	8.28	10.98	4.65	11.50	3.99
1976	14.57	8.01	14.70	8.14	10.22	4.50	10.08	4.38

Table C-2

Nominal and Real Rates of Return on Net Worth: Nonfarm, Nonfinancial Sector, 1947-76

	Nominal		Real	
	Before tax	After tax	Before tax	After tax
1947	21.36	14.98	10.59	5.84
1948	20.59	14.03	8.41	3.59
1949	18.14	12.26	9.93	5.58
1950	22.13	14.88	11.16	5.76
1951	24.47	14.19	11.71	4.11
1952	20.89	11.02	13.71	6.26
1953	19.25	10.81	12.12	5.58
1954	15.66	9.21	10.54	5.40
1955	18.45	11.31	11.72	5.96
1956	18.55	11.35	11.83	5.96
1957	16.49	10.94	11.32	6.75
1958	13.34	8.63	9.17	5.25
1959	15.76	10.00	11.01	6.24
1960	13.19	7.73	9.27	4.71
1961	12.07	6.70	8.43	3.88
1962	13.24	7.74	9.33	4.73
1963	13.62	8.03	9.26	4.57
1964	15.66	9.73	11.17	6.24
1965	18.14	10.75	16.36	8.40
1966	16.42	9.89	14.63	8.06
1967	14.77	8.87	13.36	7.36
1968	15.92	9.36	14.87	8.06
1969	16.42	9.89	14.88	8.16
1970	13.58	7.63	12.59	6.61
1971	15.50	10.00	10.22	5.74
1972	16.46	10.53	10.74	5.89
1973	22.57	15.93	14.83	9.03
1974	27.62	18.70	16.48	9.68
1975	23.66	15.81	12.81	7.17
1976	21.51	14.38	11.87	6.74

Table C-3

Nominal and Real Rates of Return on Net Worth: Manufacturing Sector, 1947-76

	Nominal		Real	
	Before tax	After tax	Before tax	After tax
1947	25.82	18.21	15.00	8.44
1948	26.05	18.13	13.41	6.83
1949	22.94	15.73	15.64	9.69
1950	27.74	18.73	18.57	11.22
1951	30.28	17.61	17.18	6.94
1952	25.06	13.67	19.96	10.75
1953	24.24	14.26	17.82	9.61
1954	19.01	11.06	14.72	8.03
1955	22.31	13.46	16.68	9.24
1956	22.14	13.50	15.52	8.22
1957	18.72	12.08	12.70	7.08
1958	16.16	10.51	11.63	6.82
1959	18.38	11.55	13.44	7.58
1960	14.64	8.50	10.65	5.36
1961	12.81	6.93	9.07	4.01
1962	14.76	8.43	10.49	5.05
1963	17.13	10.66	12.21	6.64
1964	17.72	11.25	12.67	7.16
1965	20.53	11.42	17.32	8.29
1966	18.15	10.33	15.14	7.31
1967	14.87	8.24	12.66	5.97
1968	17.02	9.46	15.67	7.70
1969	18.40	10.32	15.44	7.01
1970	12.68	6.60	10.43	4.26
1971	15.43	9.06	11.14	5.63
1972	18.11	11.29	12.73	6.82
1973	24.91	16.88	16.01	9.20
1974	28.98	19.76	15.91	8.49
1975	22.44	15.00	10.95	5.27
1976	19.51	12.88	10.65	5.67

Notes

CHAPTER 1

1 Two other versions of the capital maintenance concept of income that exist in the accounting literature are the money capital version and the purchasing power version. See, for example, Scapens (1977), pp. 64-66.

2 See Hicks (1946), pp. 171-81.

3 There is no doubt that the adherence to such practices as valuing, say, current assets at cost or market value, whichever is lower, has introduced subjective considerations of potentially significant proportions, with corresponding risks that interfirm comparability of financial statements might be impaired. It is probable, however, that the evolution of increasingly stringent and uniform Canadian public accounting standards during the last 30 years has greatly reduced these risks.

CHAPTER 2

1 This concept was modified in 1972 when the two-year write-off – 50 per cent each year – provision was introduced with respect to new machinery and equipment acquired by manufacturing and processing firms.

2 It is widely anticipated that the Canadian Institute of Chartered Accountants will legislate new depreciation (and other) rules to reflect the effects of inflation within the next year or two. Whether and when Canadian tax rules will be changed is anybody's guess. A description of changes in the accounting practices of various other countries can be found in the report of the Sandilands Committee (1975) and in Skinner (1977).

3 An apparently rare exception is Jenkins (1977*a*).

4 The absence of data relating to gross depletable assets was particularly restrictive, since it rendered unduly speculative any estimate of the equivalent of useful lives.

5 The adjustment methodology adopted was derived from Bossons (1977). A critical element in the adjustment is the assumption that the closing inventories of all firms are valued on a FIFO basis at year-end replacement cost.

6 *Budget Document*, issued by the Honourable Donald J. McDonald, Minister of Finance, March 31, 1977, p. 37 (quoted in *Report*, Ontario Committee on Inflation Accounting, p. 64).

7 See for example, Jenkins (1977*b*); and Chant and McFetridge (1979).

8 See Feldstein (1966); Feldstein and Chamberlain (1973); Feldstein and Eckstein (1970); Feldstein, Green, and Sheshinski (1976); and Pesando (1977), and references cited therein.

9 Current assets such as marketable securities may be reported at market value when that is lower than cost. Since in a study of aggregates the necessary firm-specific data are not available, it is assumed that these assets were reported at cost.

10 The data did not permit the identification of investments and loans, etc., within and beyond the sectors. It is highly probable that an overwhelming proportion of these items was within the nonfarm, nonmanufacturing sector. As for the manufacturing sector, the proportion is probably smaller but perhaps not unduly so.

CHAPTER 3

1 For simplicity, the term "depreciation" connotes, in this specific context only, depletion as well as depreciation in its usual sense.

2 Scapens, (1977), p. 65.

3 Canadian Institute of Chartered Accountants (1979).

4 This should not be taken to mean that the other differences between our methodology of adjusting for inflation and that of the Committee are necessarily insignificant. As is apparent, we disagree, for example, with the Committee's "financing adjustment," and this can make for an appreciable difference in the measurement of real profits. Another example of a potentially nontrivial difference concerns the contrasting treatments of deferred taxes. Other such examples may also exist.

5 Taking into account estimated salvage value at the end of its useful life. Since this study is concerned with large aggregates, this consideration is ignored.

6 Canadian Institute of Chartered Accountants (1979), pp. 30-31.

7 See for example, Kirkman (1974), pp. 65-76, and further references cited therein.

8 Sandilands Committee, (1975), pp. 142-46.

9 *Report* of the Ontario Committee on Inflation Accounting (1977), p. 126.

10 It is likely that this has not emerged clearly in the literature because of the variety of concepts of income that have been contemplated explicitly or implicitly. Although the income concept preferred by the Sandilands Committee, for example, appears to have something in common with the capital maintenance concept, the Committee, while not favouring a backlog depreciation adjustment, nevertheless did not see the need for a working capital adjustment either. Nor, for that matter, was an adjustment for debt effects thought necessary.

11 The argument remains unchanged if it is assumed that some of the shielded assets are used to reduce liabilities or to acquire other assets, such as long-term loans receivable or securities of affiliates.

12 Granted that it may seem at first glance to be something of a departure from the traditional view of depreciation for the firm to apply depreciation on existing assets to the replacement of old ones, this is in fact fully consistent with the concept of capital maintenance, as explained in this paper.

13 Some of the others are: Alexander and Barrington (1975); Stamp and Mason (1977); Kirkman (1974); and *Report* of the (New Zealand) Committee of Inquiry into Inflation Accounting (1977).

14 Kirkman, (1974), p. 141.

15 It is worth noting that there is evidence that provision for backlog depreciation is being made along these lines by various British firms. See Sandilands Committee (1975); and Kirkman (1974).

CHAPTER 4

1 See for example, Kopcke (1978); Lovell (1978), though it is not obvious that this writer includes inventories in capital; and Feldstein and Summers (1977).

2 Statistics Canada, *Corporation Financial Statistics*, 1971, Cat. 61-207 (annual), Appendix B.

3 Strictly speaking, capital should be measured at the start of the year; however, because a crucial data series on fixed assets was available only in terms of mid-year figures, the other components of capital were also measured in mid-year terms.

4 Attention is drawn to the data problems pertaining to the years 1965 to 1970, inclusive, described in the section dealing with income taxes, Appendix B.

CHAPTER 5

1 See, for example, Nordhaus (1975); Feldstein and Summers (1977); and Lovell (1978).

2 This is the view argued and tested in Department of Finance (1980).

Bibliography

AGRAWAL, Surendra, P. "Accounting for the Impact of Inflation on a Business Enterprise," *Accounting Review* (October 1977).

ALEXANDER, Michael O. and BARRINGTON, J. Douglas. "A Feasible Measure of Current Value Accounting," *C. A. Magazine* (September 1975).

ALEXANDER, Michael O., ed. *Accounting For Inflation*. Toronto: MacLean-Hunter, 1975.

BAKKER, P. *Inflation and Profit Control*. Agincourt: Methuen, 1974.

BASU, S. and HANNA, J. R. "Accounting for Changes in the General Purchasing Power of Money: The Impact on Financial Statements of Canadian Corporations for the Period 1967-74," *Cost and Management* (January-February 1976).

BAXTER, W. T. *Accounting Values and Inflation*. London: McGraw-Hill, 1975.

BELANGER, Gerard, and MCILVEEN, Neil. *Rate of Return and Investment Profitability*. Ottawa: Department of Finance, 1980.

BOERSEMA, John M. *General Price Level Accounting*. Supplementary Paper No. 4, prepared for the Ontario Committee on Inflation Accounting. Toronto: Government of Ontario, 1977.

BOSSONS, John. *The Impact of Inflation on Income and Financing of Large Non-Financial Corporations*. Supplementary Paper No. 5, prepared for the Ontario Committee on Inflation Accounting. Toronto: Government of Ontario, 1977.

CAGAN, Phillip, and LIPSEY, Robert E. *The Financial Effects of Inflation*. National Bureau of Economic Research General Series No. 103. Cambridge, Mass.: Bellinger Publishing, 1978.

Canadian Institute of Chartered Accountants, Accounting Research Committee. *Current Cost Accounting*. Toronto, 1979.

CHANT, J. F., and MCFETRIDGE, D. G. *The Allocative Effects of Inflation*, Ottawa: Anti-Inflation Board, 1979.

DAVIDSON, Sydney, and WEIL, Roman L. "Inflation Accounting: Implications of the FASB Proposal," in *Inflation and the Income Tax*, edited by Henry J. Aaron. Washington: Brookings Institution, 1976.

———. "Inflation Accounting: The SEC Proposal for Replacement Cost Disclosures," *Financial Analysts Journal* (March-April 1976).

———; STICKNEY, Clyde; and WEIL, Roman L. *Inflation Accounting: A Guide to the Accountant and Financial Analyst*. New York: McGraw-Hill, 1976.

FABRICANT, Solomon. "Accounting for Business Income under Inflation: Current Issues and Views in the United States," *Review of Income and Wealth* (March 1978).

FALKENSTEIN, Angela, and WEIL, Roman L. "Replacement Cost Accounting: What Will Income Statements Based on the SEC Disclosures Show? – Part I," *Financial Analysts Journal* (January-February 1977).

———. "Replacement Cost Accounting: What Will Income Statements Based on the SEC Disclosures Show? – Part II," *Financial Analysts Journal* (March-April 1977).

FELDSTEIN, M. "Inflation, Income Taxes and the Rate of Interest: A Theoretical Analysis," *American Economic Review* (December 1966).

———, and CHAMBERLAIN, G. "Multimarket Expectations and the Rate of Interest," *Journal of Money, Credit and Banking* (November 1973).

———, and ECKSTEIN, O. "The Fundamental Determinants of the Interest Rate," *Review of Economics and Statistics* (November 1970).

———, and SUMMERS, L. "Is the Rate of Profit Falling," *Brookings Papers on Economic Activity*, 1(1977).

———; GREEN, J.; and SHESKINSKI E. *Inflation and Taxes in a Growing Economy with Debt and Equity Finance*. Discussion Paper No. 481. Cambridge, Mass.: Harvard Institute of Economic Research, 1976.

GAUDEKET, A. "An Application of Replacement Value Theory," *Journal of Accountancy* (July 1960).

HICKS, J. R. *Value and Capital*, 2nd ed. Oxford: Oxford University Press, 1956.

Inflation Accounting Committee, (cited hereafter as "the Sandilands Committee.") *Inflation Accounting*, Report of the Inflation Accounting Committee (F.E.P. Sandilands, Chairman). London: Her Majesty's Stationery Office, 1975.

JENKINS, Glenn P. (1977*a*) *Capital in Canada: Its Social and Private Performance*, 1965-74 Discussion Paper 98. Ottawa: Economic Council of Canada, 1977.

———. (1977b) *Inflation: Its Financial Impact on Business in Canada*. Ottawa: Economic Council of Canada, 1977.

KIRKMAN, Patrick R. A. *Accounting under Inflationary Conditions*. London: George Allen and Unwin, 1974.

KOPCKE, Richard W. "The Decline in Corporate Profitability." *New England Economic Review* (May-June 1978).

LARGAY, James A., III, and LIVINGSTONE, John Leslie *Accounting for Changing Prices*, New York: John Wiley and Sons, 1976.

LOVELL, Michael C. "The Profit Picture: Trends and Cycles," *Brookings Papers on Economic Activity*, 3(1978).

MEY, Abram, and MOST, Kenneth S. "Replacement Value Accounting." *The Accountant*, (September 7, 1963).

NORDHAUS, William D. "The Falling Share of Profits," *Brookings Papers on Economic Activity* 1(1975).

PESANDO, James E. *The Impact of Inflation on Financial Markets in Canada*. Montreal: C. D. Howe Research Institute, 1977.

REVSINE, Lawrence, and WEYGANDT, Jerry J. "Accounting for Inflation: The Controversy," *The Journal of Accountancy* (October 1974):77

ROSENFIELD, Paul. "The Confusion between General Price-Level Restatement and Current Value Accounting," *Journal of Accountancy* (October 1972).

Report of the Committee of Inquiry into Inflation Accounting. Wellington, New Zealand: Government Printer, 1977.

———. of the Ontario Committee on Inflation Accounting. Toronto: Government of Ontario, 1977. Sandilands Committee (see Inflation Accounting Committee).

SHOVEN. John D; and BULOW, Jeremy I. "Inflation Accounting and Nonfinancial Corporate Profits: Financial Assets and Liabilities," *Brookings Papers on Economic Activity* 1(1976).

———. "Inflation Accounting and Nonfinancial Corporate Profits: Physical Assets." *Brookings Papers on Economic Activity* 3(1975).

SHWAYDER, Keith. "The Capital Maintenance Rule and the Net Asset Valuation Rule," *Accounting Review* (April 1969).

SKINNER, Ross M. *Memorandum on the Significance of Debt Financing during an Inflationary Period*. Supplementary Paper No. 2, prepared for the Ontario Committee on Inflation Accounting, Toronto: Government of Ontario, 1977.

STAMP, Edward, and MASON, Alister K. "Current Cost Accounting: British Panacea or Quagmire," *Journal of Accountancy* (April 1977).

STERLING, Robert R. "Relevant Financial Reporting in an Age of Price Changes." *Journal of Accountancy* (February 1975).

TIDEMAN, T. Nicolaus, and TUCKER, Donald P. "The Tax Treatment of Business Profits under Inflationary Conditions," in *Inflation and the Income Tax*, edited by Henry J. Aaron. Washington: Brookings Institution, 1976.

VANCIL, Richard F. "Inflation Accounting – The Great Controversy." *Harvard Business Review* (March-April 1976).

———, and WEIL, Roman L. "Current Replacement Cost Accounting, Depreciable Assets, and Distributable Income," *Financial Analysts Journal* (July-August 1976).